

Ultrafast and Nanoscale Diodes

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Charge carrier transport across interfaces of dissimilar materials (including vacuum) is the essence of all electronic devices. Ultrafast charge transport across a nanometer scale length is of fundamental importance in the miniaturization of vacuum and plasma electronics. With the combination of recent advances in electronics, photonics, and nanotechnology, these miniature devices may integrate with solid-state platforms, achieving superior performance. This talk review recent modeling efforts on electrical contact resistance, quantum tunneling and ultrafast electron emission and transport. Unsolved problems and challenges in these areas are addressed.